

## VERIFICATION OF TRANSLATION

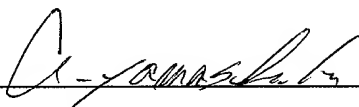
I, Akihiko YAMASHITA of 3rd Floor, Oak Building Kyobashi, 16-10,  
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1. That I am well acquainted with both English and Japanese languages,  
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2. That the attached document is a true and correct translation made by  
me to the best of my knowledge and belief of:

The specification accompanying the Application No. 09-313041 for a  
Patent made in Japan filed on November 14, 1997.

April 16, 2008

A handwritten signature in black ink, appearing to read 'A. Yamashita', is written over a horizontal line.

Akihiko YAMASHITA

(No witness required)

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[Title of the Invention] PATTERN-FORMING MATERIAL AND METHOD  
FOR PATTERN FORMATION

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[Document Title] SPECIFICATION

[Title of the Invention] PATTERN-FORMING MATERIAL AND METHOD  
FOR PATTERN FORMATION

[Patent claims]

[Claim 1] A pattern-forming material adapted for optically forming a pattern, comprising: a substrate, and provided on the substrate a layer containing a photocatalyst which varies wettability of an organic compound through light irradiation and the organic compound of which wettability varies, wherein the organic compound of which wettability varies is obtained from a composition having a reactive organosilicone compound.

[Claim 2] The pattern-forming material according to claim 1, characterized in that the photocatalyst is contained in a layer comprising the composition having the reactive organosilicone compound.

[Claim 3] The pattern-forming material according to claim 1, characterized in that the layer comprising the composition having the reactive organosilicone compound is formed on a photocatalyst-containing layer.

[Claim 4] The pattern-forming material according to any one of claims 1 to 3, characterized in that 60 % weight or more of siloxane contained in the layer comprising the composition having the reactive organosilicone compound is obtained by the

reactive organosilicone compound.

[Claim 5] The pattern-forming material according to any one of claims 1 to 4, characterized in that the pattern-forming material is used for original plate for a printing plate formed on a substrate made of aluminum and alloys thereof.

[Claim 6] The pattern-forming material according to any one of claims 1 to 5, characterized in that the substrate has a primer layer preliminary formed.

[Claim 7] A method for pattern formation adapted for optically forming a pattern,

characterized in that a pattern-forming material of which surface wettability is varied through photocatalytic action upon pattern-wise exposure,

characterized in that the pattern-forming material comprises: a substrate, and provided on the substrate a layer containing a photocatalyst which varies wettability of an organic compound through light irradiation and the organic compound of which wettability varies, and

further characterized in that the organic compound is obtained from a composition containing a reactive organosilicone compound.

[Detailed description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a novel pattern-forming material which can be used for printing and other purposes, and especially to a pattern-forming material which can provide a novel original plate for a printing plate.

[0002]

[Prior Art]

In plates for lithography, i.e., a kind of printing method, printing ink-receptive lipophilic areas and printing ink-unreceptive areas are provided on a flat plate. In use, an ink image to be printed is formed on the lipophilic areas and then transferred and printed onto paper or the like.

[0003]

A large number of proposals have been made on original plates for printing plates that are used in offset printing which is representative lithography. Among them, plate for offset printing wherein the original plate for a printing plate is directly exposed by electrophotography to prepare a printing plate is widely used. The original plate for an electrophotographic offset printing plate is prepared by a method which comprises the steps of: providing a photoconductive layer composed mainly of supporting body to form a photoreceptor; exposing the photoreceptor by electrophotography to form a highly lipophilic image on the surface of the photoreceptor; and subsequently treating the photoreceptor with a desensitizing

liquid to hydrophilify nonimage areas to prepare an original plate for offset printing. Hydrophilic areas are immersed in water or the like and are consequently lipophobified, and a printing ink is received by the lipophilic image areas followed by transfer onto paper or the like.

An original plate for waterless lithography has also been used wherein, instead of the immersion in water to form lipophobic areas, highly lipophobic areas are formed without relying upon immersion in water or the like to form ink-receptive areas and ink-unreceptive areas.

[0004]

Further, a method for producing an original plate for lithography using a heat mode recording material has been proposed which can realize the formation of highly ink-receptive areas and ink-repellent areas by laser beam irradiation.

Heat mode recording materials can eliminate the need to provide the step of development and the like, and advantageously enables printing plates to be produced simply by forming an image using a laser beam. They, however, suffer from problems associated with the regulation of laser beam intensity, the disposal of residues of solid materials denatured by the laser, the plate wear and the like.

[0005]

The inventors had previously proposed a method for pattern



formation using a material of which wettability varied through photocatalytic action and a pattern-forming material in the Japanese Patent Application Laid-Open No. 9-214825 as a pattern-forming material which can solve problems mentioned above. The present invention provides a pattern-forming material having further excellent properties compare to those pattern-forming materials using photocatalysts.

[0006]

[Problems to be solved by the Invention]

It is an object of the present invention to provide a novel pattern-forming material. It is another object of the present invention to obtain a pattern-forming material which can provide a novel original plate for a printing plate that can solve the problems of the conventional original plates for printing plates.

[0007]

[Means for solving the problem]

The present invention provides a pattern-forming material adapted for optically forming a pattern, comprising: a substrate, and provided on the substrate a layer containing a photocatalyst which varies wettability of an organic compound through light irradiation and the organic compound of which wettability varies, wherein the organic compound of which wettability varies is obtained from a composition having a reactive organosilicone compound.

The pattern-forming material is characterized in that the photocatalyst is contained in a layer comprising the composition having the reactive organosilicone compound.

The pattern-forming material is characterized in that the layer comprising the composition having the reactive organosilicone compound is formed on a photocatalyst-containing layer.

The pattern-forming material is characterized in that 60 % weight or more of siloxane contained in the layer comprising the composition having the reactive organosilicone compound is obtained by the reactive organosilicone compound.

The pattern-forming material is characterized in that the pattern-forming material is used for original plate for a printing plate formed on a substrate made of aluminum and alloys thereof.

The pattern-forming material is characterized in that the substrate has a primer layer preliminary formed.

Further, a method for pattern formation adapted for optically forming a pattern is characterized in that a pattern-forming material of which surface wettability is varied through photocatalytic action upon pattern-wise exposure, characterized in that the pattern-forming material comprises: a substrate, and provided on the substrate a layer containing a photocatalyst which varies wettability of an organic compound

through light irradiation and the organic compound of which wettability varies, and further characterized in that the organic compound is obtained from a composition containing a reactive organosilicone compound.

[0008]

[Preferred embodiment of the Invention]

The present invention relates to a pattern-forming material wherein a pattern is formed by utilizing the action of a photocatalyst that, upon light irradiation, creates a chemical change of materials present around it and thereby forming a pattern in the light-irradiated area. According to the present invention, the pattern, when used in printing of designs, images, letters and the like, refers to areas that, upon transfer of the printing ink, receive or repel the ink.

[0009]

The mechanism of action of the photocatalyst typified by titanium oxide according to the present invention has not been fully elucidated yet. However, it is considered that carriers produced by light irradiation influence the chemical structure of the organic material through a direct reaction with a neighboring compound, or otherwise by active oxygen species produced in the presence of oxygen and water.

[0010]

Proposals utilizing the photocatalytic action include one

wherein oil stains are decomposed by light irradiation to hydrophilify the oil stains, enabling the oil stains to be washed away by water, one wherein a hydrophilic film is formed on the surface of glass or the like to impart antifogging properties, and one wherein a photocatalyst-containing layer is formed on the surface of tiles or the like to form the so-called antimicrobial tiles or the like that can reduce the number of bacteria floating in air.

[0011]

Enhancement in receptivity of pattern areas to printing inks, toners or the like, by utilizing a photocatalytic action such as decomposition of the organic material to vary the wettability of pattern-formed area and the pattern-unformed substrate area has realized the pattern-forming material according to the present invention.

[0012]

Photocatalysts usable in the pattern-forming material according to the present invention include metal oxides known as photoconductors, such as titanium oxide ( $\text{TiO}_2$ ), zinc oxide ( $\text{ZnO}$ ), tin oxide ( $\text{SnO}_2$ ), strontium titanium oxide ( $\text{SrTiO}_3$ ), tungsten oxide ( $\text{WO}_3$ ), bismuth oxide ( $\text{Bi}_2\text{O}_3$ ), and iron oxide ( $\text{Fe}_2\text{O}_3$ ). Among them, titanium oxide is particularly preferred because it has high band gap energy and is chemically stable, nontoxic, and

easily available.

Titanium oxide may be in anatase form or rutile form with anatase form of titanium oxide being preferred.

Examples of anatase form of titanium oxide usable herein include ammonia peptization type titania sols (A-6, average crystal diameter 8 nm, manufactured by TAKI CHEMICAL CO., LTD.; STS-11, average crystal diameter 17 nm, manufactured by Ishihara Sangyo Kaisha Ltd.) and nitric acid peptization type titania sols (TA-15, average crystal diameter 12 nm, manufactured by Nissan Chemical Industries Ltd.).

[0013]

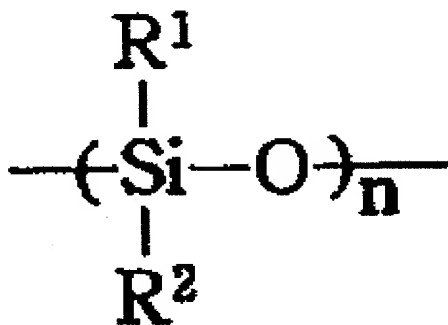
The photocatalyst-containing layer according to the present invention may be formed by dispersing a photocatalyst in a binder. The photocatalyst has a fear of decomposing the binder as well upon photoexcitation. Therefore, the binder preferably has a component high has high binding energy as a main component thereof. Further, when use of the pattern-forming material as printing plates is taken into consideration, plate wear and abrasion resistance are also required of the photocatalyst-containing layer.

As the binder dispersing the photocatalyst, a binder wherein organosiloxane excellent in oil repellency and water repellency is cross-linked is preferable because it has good strength. Specifically, a compound having the following

skeleton can be cited.

[0014]

[Chemical Formula 1]



[0015]

In the chemical formula 1, "n" is an integer of two or more; and R1 and R2 represent a substituted or unsubstituted alkyl, alkenyl, aryl, or cyanoalkyl group having 1 to 10 carbon atoms. Not more than 40% by mole of the whole is accounted for by vinyl, phenyl, or phenyl halide. R1 and R2 preferably represent a methyl group because the surface energy of the silicone is the smallest. The molar proportion of the methyl group is preferably not less than 60%. Further, the chain end or the side chain has in its molecular chain at least one reactive group, such as a hydroxyl group.

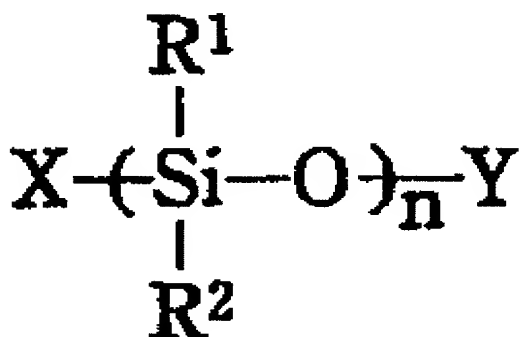
[0016]

Further, a binder wherein organosilicone skeleton is crosslinked is preferable as a binder used in the present

invention. A binder with a part of  $R^1$  and  $R^2$  of the organosiloxane chain being substituted by a hydrogen atom may also be used as the binder for the present invention. However, it is preferable to use a binder wherein a modified organosilicone compound showing the following reaction is crosslinked.

[0017]

[Chemical Formula 2]



[0018]

In Chemical Formula 2, "n" is an integer of two or more; and  $R^1$  and  $R^2$  represent a substituted or unsubstituted alkyl, alkenyl, aryl, or cyanoalkyl group having 1 to 10 carbon atoms.  $R^1$  and  $R^2$  preferably represent a methyl group.

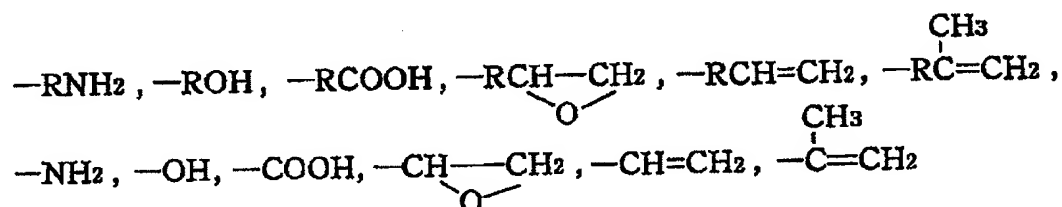
[0019]

The molecular weight of the silicone is preferably 500 to 1,000,000. When the molecular weight is excessively small, the content of  $R^1$  and  $R^2$  is relatively low, making it difficult to develop the oil repellency and the like. On the other hand, when the molecular weight is excessively large, the content of the end in "X" and "Y" is low, posing a problem that the crosslinking density is small.

Further, "X" and "Y", which may be the same or different, are selected from the following groups. "R" represents a hydrocarbon chain having 10 or less carbon atoms.

[0020]

[Chemical Formula 3]



[0021]

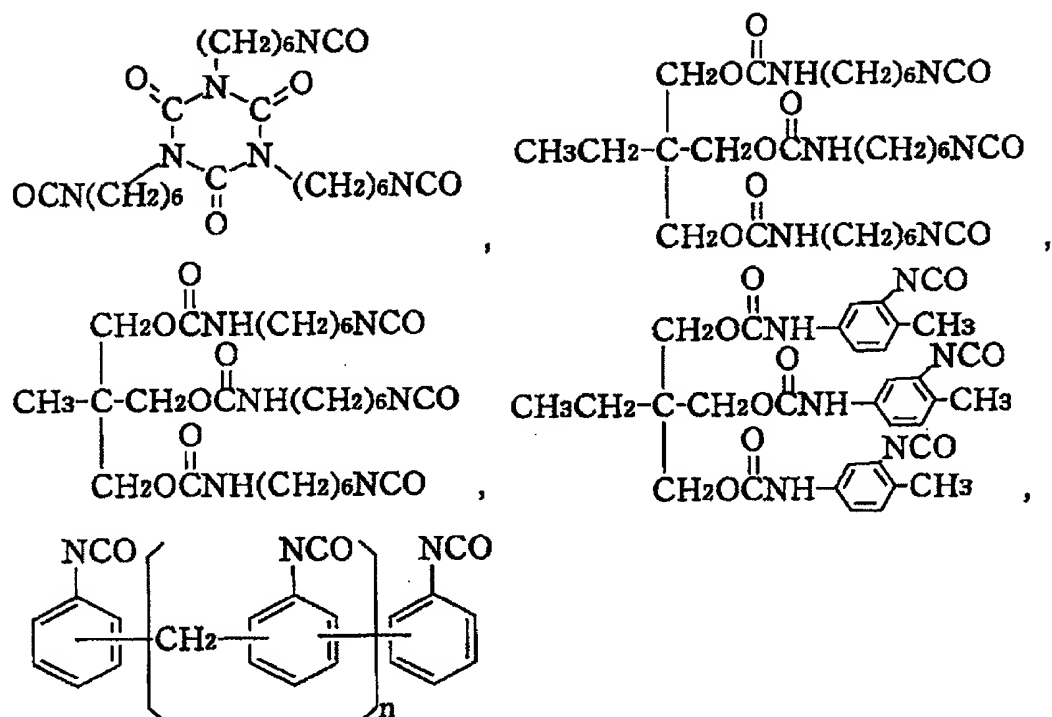
Reactive modified silicones usable in the present invention may be either one wherein crosslinking is performed by condensation or one wherein crosslinking is performed in the presence of a crosslinking agent. When the crosslinking is performed by condensation, a tin, zinc, lead, calcium, or manganese salt of carboxylic acid, preferably, a laurate or chloroplatinic acid, may be added as a catalyst.

[0022]

On the other hand, when the crosslinking is performed in the presence of a crosslinking agent, crosslinking agents usable herein include isocyanates commonly used as crosslinking agents in the art Preferred examples thereof are as follows.



[Chemical Formula 4]



[0023]

The reactive organosilicone compound may be of aqueous emulsion type. The aqueous emulsion type compound is easy to handle because an aqueous solvent is used.

[0024]

The photocatalyst-containing layer comprising the organosilicone compound of the present invention preferably has a thickness of 0.2 to 50  $\mu\text{m}$ .

Since the photocatalyst-containing layer of the present invention undergoes crosslinking reaction, it shows a large strength when attached to a plate body of a printer as a plate

material. Thus, a plate material having a strong durability can be obtained. Moreover, since the number of binding between silicon and an organic group such as an alkyl group becomes more and oil repellency becomes better.

[0025]

According to the present invention, the oil repellency may be enhanced by incorporating the reactive organosiloxane compound as the binder in combination with a stable organosilicone compound that does not cause any crosslinking reaction, such as dimethylpolysiloxane.

In this case, not less than 60% by weight of the siloxane contained in a layer formed from a composition containing a reactive organosilicone compound is preferably accounted for by the siloxane obtained from the reactive organosiloxane. When the proportion is less than 60% by weight, the amount of dimethylsiloxane is reduced, unfavorably resulting in deteriorated water repellency.

[0026]

The content of photocatalyst contained in the photocatalyst-containing layer is preferably 5 to 60% by weight, more preferably 20 to 40% by weight. The photocatalyst and the binder may be dispersed in a solvent to prepare a coating liquid followed by coating of the liquid. Solvents usable herein include alcoholic organic solvents, such as ethanol and

isopropanol.

[0027]

A photocatalyst having a smaller particle diameter can more effectively cause the photocatalytic reaction and hence is preferred. Use of a photocatalyst having an average particle diameter of preferably not more than 50 nm, more preferably not more than 20 nm, is preferred. Further, the photocatalyst having a smaller particle diameter can advantageously provide a photocatalyst-containing layer having smaller surface roughness. A surface roughness of the photocatalyst-containing layer exceeding 10 nm is unfavorable because concavity and convexity in the surface makes the wettability to water, a solution or an ink poor and thereby appearance of wettability becomes unsatisfactory.

The excitation wavelength of the anatase form of titania is not more than 380 nm. Therefore, the excitation of this type of photocatalysts should be carried out using ultraviolet light. Ultraviolet light sources usable herein include mercury lamps, metal halide lamps, xenon lamps, excimer lamps, excimer laser, YAG laser, and other ultraviolet light sources. The wettability of the film surface may be varied by varying the ultraviolet light intensity, exposure and the like.

[0028]

In case the pattern-forming material of the present

invention is an original plate for a printing plate, a composition containing a reactive organosilicone compound with a photocatalyst dispersed is coated on the substrate by using a coating device such as a reverse roll coater, an air knife coater, a bead coater, a slide coater or a mayer bar coater, or by using a spin-coating device such as a wheeler. After that, the composition is dried at temperature between 40 to 150°C or the composition is cured by heat to form a photocatalyst-containing layer.

The photocatalyst-containing layer thereby obtained may have a protective film laminated thereon as a protective layer until the layer is actually used.

[0029]

In the above, the case when a photocatalyst-containing layer is a layer made of a composition containing reactive organosiloxane is explained. It may also be a case when a photocatalyst-containing layer containing no reactive organosiloxane is formed first and a layer containing reactive organosiloxane with no photocatalyst is subsequently formed on the photocatalyst-containing layer.

In the latter case, the layer containing reactive organosilicone with no photocatalyst preferably has a thickness of 0.1 $\mu$ m to 1 $\mu$ m to allow the photocatalyst-containing layer to be irradiated sufficiently. The the photocatalyst-containing

layer which being an under layer is preferably a layer which contains an organosilicone compound. Further a common resin such as a polyester resin and acrylic resin may be contained as a binder.

In the case the pattern-forming material has a laminate structure, a layer of dimethylsiloxane presented nearby the exposed photocatalyst is modified and the hydrophobic properties in the surface of the layer becomes hydrophilic, thus a similar properties as in the case of being used in the photocatalyst-containing layer can be obtained.

[0030]

Further, a primer layer may be formed before the coating of the composition for photocatalyst-containing layer. Resins such as an epoxy resin and polyurethane resin can be used as the primer layer.

[0031]

In preparing the pattern-forming material of the present invention as an original plate for a printing plate, substrates usable herein include those commonly used in offset printing plates, such as aluminum. Alternatively, a pattern may be formed by coating a photocatalyst-containing composition layer onto a screen of a woven fabric or a nonwoven fabric and exposing the photocatalyst-containing layer. When the substrate is constituted by a material, such as a plastic, that has a fear

of being deteriorated by the photo-oxidation activity of the photocatalyst, a silicone, a fluoro resin or the like may be previously coated onto the substrate to form a protective layer. A photochromic material such as spiropyrene may be incorporated into the composition to form a visualized pattern which is formed by the variation caused in wettability. Further, a desired metal pattern may be formed by applying light to the pattern-forming material according to the present invention to form a predetermined pattern of hydrophilic areas, treating the hydrophilic areas with a catalyst for chemical plating and immersing the pretreated material in a chemical plating catalyst to form a desired metal pattern. According to this method, a metal pattern can be formed without the formation of a resist pattern, making it possible to produce printed boards, electronic circuit elements and the like.

[0032]

#### [EXAMPLES]

The following examples further illustrate the present invention.

##### Example 1

A 20 wt % dimethylformamide solution of a primer (a primer paint for metals, Kan-coat 90T-25-3094, manufactured by Kansai Paint Co., Ltd.) was coated on a 0.23 mm-thick degreased aluminum sheet. The coated aluminum sheet was dried at 200° C for 1 min.

Thus, a 3  $\mu$ m-thick primer layer was formed.

A composition comprising 9 g of polydimethylsiloxane of which both ends had been modified with OH (X-22-160AS, functional group equivalent 112, manufactured by The Shin-Etsu Chemical Co., Ltd.), 1 g of a crosslinking agent (polyisocyanate, Coronate L, manufactured by Nippon Polyurethane Industry Co., Ltd.), 0.05 g of butyltin dilaurate, 1 g of titanium oxide powder (ST-01, particle diameter 7 nm, Ishihara Sangyo Kaisha Ltd.), 5 g of 1,4-dioxane, and 5 g of isopropanol was coated onto the primer layer. The coating was dried at 120° C for 2 min to form a 1  $\mu$ m-thick photocatalyst-containing layer. Thus, an original plate for a printing plate was obtained. The average roughness of the surface of the photocatalyst-containing layer was measured by the tracer method and found to be Ra=2 nm.

[0033]

The original plate was then irradiated with an excimer laser at 248 nm at an intensity of 200 mJ/cm<sup>2</sup> to form a pattern and to induce a photocatalytic reaction.

The contact angle of exposed areas with water and n-octane was measured with a contact angle goniometer (Model CA-Z, manufactured by Kyowa Interface Science Co., Ltd.). As result, a difference in wettability could be confirmed. The results of measurement are shown in Table 1.

[0034]

## Example 2

The printing plate prepared in Example 1 was mounted on an offset printing machine (Komon Sprint Four Color Machine), and printing was carried out using a printing ink (Dri-o-color Deep Blue ink, manufactured by Dainippon Ink and Chemicals, Inc.) onto coated paper. As a result, good prints could be obtained.

[0035]

## Example 3

A primer layer was formed onto a 0.23 mm-thick aluminum substrate in the same manner as in Example 1. Subsequently, a composition comprising 8 g of polydimethylsiloxane of which both ends had been modified with OH (X-22-160AS, manufactured by The Shin-Etsu Chemical Co., Ltd.), 1 g of polydimethylsiloxane (KF96, manufactured by The Shin-Etsu Chemical Co., Ltd.), 1 g of a crosslinking agent (polyisocyanate, Coronate L, manufactured by Nippon Polyurethane Industry Co., Ltd.), 0.05 g of dibutyltin dilaurate, 1 g of titanium oxide powder (ST-01, particle diameter 7 nm, Ishihara Sangyo Kaisha Ltd.), 5 g of toluene, and 5 g of isopropanol was coated onto the primer layer. The coating was dried at 150° C for 2 min to form a 1  $\mu$ m-thick photocatalyst-containing layer. Thus, an original plate for a printing plate was obtained.

The average roughness of the surface of the photocatalyst-containing layer was measured by the tracer method



and found to be  $R_a=2$  nm.

[0036]

The original plate was then irradiated with an excimer laser at 248 nm at an intensity of  $200 \text{ mJ/cm}^2$  to form a pattern and to induce a photocatalytic reaction.

The contact angle of exposed areas with water and n-octane was measured with a contact angle goniometer (Model CA-Z, manufactured by Kyowa Interface Science Co., Ltd.). As result, a difference in wettability could be confirmed. The results of measurement are shown in Table 1.

Further, in the same manner as in Example 2, the printing plate thus prepared was mounted on an offset printing machine (Komori Sprint Four Color Machine), and printing was carried out using a printing ink (Dri-o-color Deep Blue ink, manufactured by Dainippon Ink and Chemicals, Inc.) onto coated paper. As a result, good prints could be obtained.

[0037]

#### Example 4

3 g of Glasca HPC7002 (manufactured by Japan Synthetic Rubber Co., Ltd.), a silica sol, and 1 g of HPC402H (manufactured by Japan Synthetic Rubber Co., Ltd.), an alkylalkoxysilane, were mixed together, and the mixture was stirred for 5 min. The resultant solution was spin coated onto a glass substrate having an area of  $7.5 \text{ cm}^2$  to form a  $2 \text{ }\mu\text{m}$ -thick sodium ion block layer.

Next, 3 g of isopropyl alcohol, 0.76 g of a silica sol (Glasca HPC7002, manufactured by Japan Synthetic Rubber Co., Ltd.), 0.25 g of an alkylalkoxysilane (Glasca HPC402H, manufactured by Japan Synthetic Rubber Co., Ltd.), and 0.15 g of a fluoroalkylsilane (MF-160E, manufactured by Tohchem Products Corporation: a 50 wt % isopropyl ether solution of N-[3-(trimethoxysilyl)propyl]-N-ethylperfluorooctanesulfonamide) were mixed together. The resultant dispersion was stirred for 20 min while maintaining the temperature at 100° C. Thereafter, 2 g of titanium oxide (ST-K01, a liquid for titanium oxide, solid content 10% by weight, manufactured by Ishihara Sangyo Kaisha Ltd.) was added thereto, followed by stirring for additional 30 min.

[0038]

The resultant dispersion was spin coated on the substrate with a sodium block layer formed thereon. The assembly was dried at a temperature of 150° C for 10 min, permitting hydrolysis and polycondensation to proceed. Thus, a 3  $\mu$  m-thick photocatalyst-containing layer with a photocatalyst being strongly fixed by an organopolysiloxane was formed.

A dispersion prepared by mixing 1 g of polydimethylsiloxane of which both ends had been modified with OH (X-22-160AS, manufactured by The Shin-Etsu Chemical Co., Ltd.), 2 g of a silica sol (Glasca HPC7002, manufactured by Japan Synthetic Rubber Co.,

Ltd.), and 1 g of an alkylalkoxysilane (HPC402H, manufactured by Japan Synthetic Rubber Co., Ltd.) and stirring the mixture for 5 min was coated onto the photocatalyst-containing layer. The coating was dried at a temperature of 150° C for 20 min. Thus, a pattern forming structure having a dried film thickness of 0.5  $\mu$ m.

The average roughness of the surface of the pattern forming structure was measured by the tracer method and found to be Ra=2 nm.

[0039]

The pattern forming structure was then irradiated with a YAG laser at 365 nm at an intensity of 200 mJ/cm<sup>2</sup> to form a pattern and to induce a photocatalytic reaction.

The contact angle of exposed areas with water and n-octane was measured with a contact angle goniometer (Model CA-Z, manufactured by Kyowa Interface Science Co., Ltd.). The results of measurement are shown in Table 1.

In the same manner as in Example 2, the original plate for a printing plate was mounted on an offset printing machine (Komori Sprint Four Color Machine), and printing was carried out using a printing ink (Dri-o-color Deep Blue ink, manufactured by Dainippon Ink and Chemicals, Inc.) onto coated paper. As a result, good prints could be obtained.

[0040]

#### Example 5

A primer layer was formed onto a 0.23 mm-thick aluminum substrate in the same manner as in Example 1. 0.76 g of an emulsion type polydimethylsiloxane (an addition reaction type) (KM-768, effective component 30%, manufactured by The Shin-Etsu Chemical Co., Ltd.), 1.34 g of water, 1 g of a titanium oxide sol (STS-01, particle diameter 7 nm, manufactured by Ishihara Sangyo Kaisha Ltd.), 0.008 g of a catalyst for an addition reaction (PM-6A), and 0.012 g of a catalyst for an addition reaction (PM-6B) were mixed together. The mixture was coated onto the primer layer. The coating was dried at 160° C for one min to form a 1  $\mu$ m-thick photocatalyst-containing layer.

A mask was brought to an intimate contact with the photocatalyst-containing layer, followed by ultraviolet irradiation from a high pressure mercury lamp at an intensity of 70 mW/cm<sup>2</sup> for 10 min to conduct a photocatalytic reaction. Thereafter, the contact angle of the sample with water and n-octane was measured with a contact angle goniometer (Model CA-Z, manufactured by Kyowa Interface Science Co., Ltd.). The results are shown in Table 1.

[0041]

#### Comparative Example 1

A machine plate was prepared in the same manner as in Example 1, except that the substrate was not treated with the primer.

The plate was mounted on a printing machine in the same manner as in Example 2. As a result, the photocatalyst-containing layer was partially separated from the aluminum substrate, indicating that the adhesion of the photocatalyst-containing layer to the substrate was unsatisfactory. Further, the plate was crosscut with a cutter, and a peeling test was carried out using a mending tape (Scotch Mending Tape, manufactured by Sumitomo 3M Ltd.). As a result, the plate provided with a primer layer was free from the separation of the photocatalyst-containing layer, whereas the plate not provided with any primer layer caused the separation of the photocatalyst-containing layer.

[0042]

#### Comparative Example 2

A commercially available original plate for offset printing was evaluated for properties using a thermal plate Pearl dry (manufactured by Presstek) in the same manner as in Example 1. The results are shown in Table 1

[0043]

#### Comparative Example 3

A waterless offset plate HGII (manufactured by Toray Industries, Inc.), a commercially available original plate for offset printing, was evaluated for properties in the same manner as in Example 1. The results are shown in Table 1.

[0044]

Table 1

	Pixel Part		Non-Pixel Part	
	Water	n-Octane	Water	n-Octane
Example 1	Below 5°	Below 5°	113°	16°
Example 3	Below 5°	Below 5°	113°	16°
Example 4	Below 5°	Below 5°	115°	15°
Example 5	Below 5°	Below 5°	107°	15°
Comparative Example 2	84°	Below 5°	105°	11°
Comparative Example 3	104°	5°	116°	13°

[0045]

[Effects of the Invention]

The pattern-forming material of the present invention uses a reactive organosilicone compound as a material of which wettability is varied by a photocatalyst provided on a substrate. Accordingly, wettability difference to water or to a lipophilic material is large so that a layer with large strength can be obtained and the pattern-forming material of the present invention can be applied for various purposes such as an original plate for a printing plate.

[Document Title]

ABSTRACT

[Abstract]

[Object] A pattern-forming material using a photocatalyst is provided.

[Means of solution] A pattern-forming material comprising a photocatalyst-containing layer provided on a substrate, wherein a layer comprising a composition containing a reactive organosilicone compound as a material of which wettability is varied by a photocatalyst is used. Accordingly, wettability difference to water or to a lipophilic material is large so that a layer pattern with large strength can be recorded.

[Elected Drawing] None